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(54) **A CONSTRUCTION INCLUDING AN IMPLEMENT FOR MILKING ANIMALS**

KONSTRUKTION MIT GERÄT ZUM MELKEN VON TIEREN

INSTALLATION COMPRENANT UN EQUIPEMENT POUR LA TRAITE D'ANIMAUX

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Description

[0001] The invention relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot.

[0002] Such implements are known, e.g. from EP-A-0091892.

[0003] Generally, a construction of the above-defined type is provided with one or a plurality of feeding troughs, in which fodder is automatically supplied to the animals to be milked. Supplying fodder is usually effected by means of a concentrate metering system on the basis of data supplied by an animal identification system, in which an animal reporting at the feeding trough receives a pre-determined quantity of fodder.

[0004] The invention has for its object to provide an implement of the type defined above, it being possible to control the quantity of fodder to be distributed to an animal.

[0005] According to the invention, this is achieved in that the construction comprises the features of claim 1. Using the above measuring device, it is possible to provide that until the end of the milking period a cow can always eat concentrate at leisure, which stimulates the milk production. In addition, it can be ascertained whether the animal's health has deteriorated.

[0006] In a preferred embodiment according to the invention, the measuring device comprises piezoelectric elements.

[0007] In accordance with a further feature of the invention, the implement comprises a feeding trough as well as one or more measuring devices for measuring the weight and/or the quantity of fodder in said feeding trough.

[0008] The invention still further relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot, characterized in that the construction comprises a metering device for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period is determined, the arrangement being such that a quantity of fodder to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period. In accordance with a further feature of the invention, the feeding period is approximately equal to the anticipated milking period for a relevant animal. By distributing the supply of concentrate uniformly over the anticipated milking period, the animal's feeling of relaxation during milking is increased. In accordance with a further feature of the invention, it is furthermore possible for the feeding period to be approximately of equal length as the anticipated time required in preparation to milking, such as, e.g., cleaning of the teats, fitting a milking cluster, premilking, etc. In accordance with a still further feature of the invention, the feeding period may also be approximately equal to the anticipated time required for an after-treatment of the teats and/or udder after milking. In a preferred embodiment, however, the feeding period is

equal to the time required for the pre-treatment, the milking period and the after-treatment.

[0009] To ensure that, if the feeding period for a given animal has not yet elapsed whilst the pre-treatment and/or the milking and/or the after-treatment of the animal has/have already been finished, the animal remains in the milking/feeding box, the implement comprises, in accordance with a further feature of the invention, means for enabling an animal to leave a milking/feeding box, such as e.g. a computer-controlled exit door and/or expelling device, which means are activated at least not until after the feeding period has ended. In accordance with a still further feature of the invention, if it has been established by the computer that the pre-treatment and/or the milking and/or the after-treatment has/have been finished whilst the feeding period of the relevant animal has not yet elapsed, the feeding period is adapted so as to provide that the animal receives the remaining quantity of fodder more rapidly.

[0010] In accordance with a further feature of the invention, the feeding period is automatically adjusted, after it has been found that prior to and/or during and/or after milking-unwanted time delays have occurred, e.g. because an animal has kicked off a teat cup which has to be refitted, to ensure that the supply of fodder is as yet uniformly distributed over the remaining anticipated feeding period. By adjusting the feeding period, it is prevented that the entire portion of fodder to be dispensed is finished prematurely, whilst actually the animal should still be kept quiet by a remaining portion of fodder still to be supplied to it, so that the milking period can be finished in a relaxed way. In accordance with a feature of the invention, the metering device comprises means, with the aid of which always relatively small portions of fodder can be dispensed into the feeding trough. Thus, it is achieved that during the feeding period the animal is at her leisure and can take a bite of concentrate.

[0011] In an embodiment according to the invention, the means, with the aid of which a relatively small portion of fodder can always be dispensed into the feeding trough, comprise a motor with a controllable number of revolutions and motor-driven blades. To stimulate the fodder consumption, the implement comprises, in accordance with a still further feature of the invention, a grinding device, by means of which the fodder to be dispensed can be ground. The invention, therefore, further relates to a construction including an implement for milking animals, such as cows, characterized in that the feeding implement comprises a grinding device, by means of which the fodder to be supplied can be ground. In accordance with a further feature of the invention, the grinding device is disposed near the metering device. In accordance with a still further feature of the invention, the grinding device comprises a plurality of fixed, spaced-apart grinding members.

[0012] In accordance with a further feature of the invention, the feeding trough is attached to the feeding box by means of a pivotal parallelogram construction. Fur-

thermore, in accordance with a feature of the invention, the milking robot, by means of which the teat cups can automatically be connected to the teats of an animal to be milked, is arranged in or near the feeding box. In accordance with a still further feature of the invention, the implement comprises a cow identification system, with the aid of which the identity of the individual animals can be determined. In accordance with a further feature of the invention, a computer programme determines the quantity of fodder to be dispensed to the animal by the metering device per feeding period and/or per 24 hours' period. In accordance with a further feature of the invention, it is determined after each feeding period, using the measuring device, how much fodder has been left behind in the feeding trough, whilst in the computer this quantity is deducted from the quantity of fodder to be supplied to a subsequent, other animal reporting at the feeding trough. Thus, it is prevented that a subsequent animal gets the fodder left behind in the feed trough in addition to its predetermined quantity of fodder. In accordance with a still further feature of the invention, the quantity of fodder left behind in the feeding trough is added to the quantity of fodder the relevant animal receives in one or more subsequent feeding periods. This achieves that during a plurality of feeding periods per 24 hours' period the predetermined quantity of fodder for that 24 hours' period is supplied to the relevant animal.

[0013] In accordance with a further feature of the invention, it is possible to set in the computer a threshold value which represents the difference between the quantity and/or the weight of the fodder supplied during a feeding period and the fodder consumed by the animal, whilst, when this threshold value is exceeded, the computer gives a signal. The signal warns an operator that something may be wrong with the animal's health, which is advantageous in particular when a milking robot is used. In accordance with a characterizing feature of the invention, the attention signal is a light signal and/or a sound signal and/or a visible indication on a display screen and/or a print-out of an attention list of the computer. In accordance with a still further characterizing feature of the invention, exceeding of the threshold value is used to check the health of an animal, whilst, after the computer has found that the threshold value has been exceeded by a predetermined percentage, the animal is automatically isolated in a separate section. In the separate section, the animal can be checked in greater detail by a supervisor or a veterinary surgeon. In accordance with a characterizing feature of the invention, isolating the animal is accomplished by means of a computer-controlled gate disposed close to the feeding/milking box.

[0014] In order to increase the rate at which the fodder is eaten, the feeding implement comprises, in accordance with the invention, means for adding a liquid, such as water, to the fodder. The invention, therefore, further relates to a construction including an implement for milking animals, such as cows, characterized in that the feeding implement comprises means for adding a liquid, such

as water, to the fodder. The means for adding the liquid comprise, in accordance with the invention, a computer-controlled valve and a spraying device. Using the spraying device, it is possible to moisten fodder, such as cubes of concentrate.

[0015] In accordance with a further feature of the invention, the spraying device may have been disposed near the feeding trough.

[0016] In accordance with a still further feature of the invention, the milking box comprises a drinking bowl, in which, depending on the animal, a quantity of liquid, such as water and/or milk, is supplied. The invention, therefore, further relates to a construction including an implement for milking animals, such as cows, equipped with a milking robot, characterized in that the implement comprises a drinking bowl, in which, depending on the animal, a quantity of liquid, such as water and/or milk, can be supplied. In accordance with a still further characterizing feature of the invention, the liquid is dispensed during the anticipated milking period and/or pre-treatment period and/or after-treatment period.

[0017] For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a side view of an implement for milking animals, including a milking robot, and a concentrate metering system including a feeding trough with a measuring device for measuring the quantity of fodder in the feeding trough;

Figure 2 is a cut-away and enlarged detail of the concentrate metering system of Figure 1, and

Figure 3 is a view of the concentrate metering system taken on the line III-III in Figure 2.

[0018] Figure 1 is a side view of a milking/feeding box 1 which includes a railing 2 disposed near the circumference of an animal 3 during its stay in the milking/feeding box 1. The railing 2 includes two uprights 4, between which there are two cross-beams 5 which are arranged remotely from and parallel to one another. At one side of the milking/feeding box, a milking robot 6 is attached to the cross-beams 5. The milking robot 6 comprises a robot arm 7 having at its end teat cups 9 supported by a carrier 8. The robot arm 7 further accommodates near the teat cups 9 a sensor 10, with the aid of which the position of the teats of an animal can be determined. The sensor may be constituted by a laser sensor. By means of (non-shown) cylinders, the robot arm 7 can be moved in the vertical direction as well as in a horizontal plane. The cylinders may be constituted by pneumatic or hydraulic cylinders, or the robot arm may be moved by means of electric motors. Furthermore, on the robot arm 7 there is disposed a vertical support 11 which is connected to a parallelogram construction 12. The other end of the parallelogram structure 12 is connected to a likewise vertically extending supporting beam 13, which is provided

at both ends with a pair of roller elements 14. The vertically extending supporting beam 13 is arranged by means of the roller elements 14 between the cross-beams 5 of the railing 2. Using a (non-shown) electric motor, the robot arm 7 can be moved in the lengthwise direction of the cross-beam 5.

[0019] Near the leading side of the milking/feeding box 1, a feeding trough 15 is attached to the upright 4. The feeding trough 15 is connected to the upright 4 by means of a parallelogram construction 16. At its bottom side, the feeding trough 15 is supported by a supporting beam 17. In addition, arranged between the supporting beam 17 and the bottom side of the feeding trough 15 there is a measuring device 18, with the aid of which the weight of the feeding trough 15 and its contents can be determined. In the present embodiment, the measuring device 18 comprises a piezoelectric element. Furthermore, at the exterior side of the milking/feeding box 1, a drinking bowl 19 is attached to the upright 4. Near the upper side of the feeding trough, a computer-controlled spraying device 20 is further attached to the upright 4, with the aid of which the fodder present in the feeding trough 15 can be moistened with a liquid, such as water. A metering device 21 for dispensing fodder into the feeding trough 15, such as concentrate, is attached over the feeding trough 15 to the upright 4. The metering device 21 includes a hopper 22 for the fodder. Against the outer wall of the hopper 22 there is attached a receiver 23 which is part of a (non-shown) cow identification system. The receiver 23 can receive signals from a transmitter 24, which by means of a collar 25 is placed around the neck of an animal.

[0020] Figures 2 and 3 illustrate in greater detail a concentrate metering device 21. At its bottom side, the hopper 22 has an aperture 26 to which a metering mechanism 27 is contiguous. The metering mechanism 27 comprises a blade wheel 29 accommodated in a cylindrical housing 28 and a computer-controlled metering slide 30 accommodated in the wall of the cylindrical housing 28. In addition, provided near the bottom side of the metering slide 30 there is a grinding device 31, with the aid of which the fodder measured out by the metering mechanism 27 can be ground. The ground fodder leaves the grinding device 31 via an aperture 37 and drops into the feeding trough 15. The grinding device 31 includes a second cylindrical housing 32 which accommodates a drivable shaft 33, on which spaced-apart knives 34 are fitted. Knives 35, which are likewise spaced apart from each other and are in a fixed position, are attached to the interior wall of the second cylindrical housing 32. During grinding of the fodder, the motor-driven knives 34 pass between the knives 35 secured on the second cylindrical housing, as a result of which the fodder is ground. Both the fixed knives 35 and the drivable knives 34 are of a curved and moon-shaped design. Arranged at the exterior side of the two cylindrical housings 28 and 32 there are arranged electric motors 36, whose number of revolutions can be made variable under the control of a computer. The elec-

tric motors 36 drive the blade wheel 29 and the rotatable knives 34, respectively.

[0021] The above-described construction including an implement for milking animals operates as follows:

[0022] After an animal 3 has entered via a (non-shown) entrance door, the milking/feeding box 1 and the transmitter 24 has come within the receiving range of the receiver 23, the animal 3 is automatically identified by the cow identification system. In addition, for each animal it can be stored in the computer how much fodder the relevant animal receives per feeding period. The quantity of fodder to be supplied can be made to depend, in the computer, on the stage of the lactation period the animal is in. In the computer there is defined for each animal the relationship between the productivity of the animal and the related fodder consumption. Thereafter, using the computer, it is computed how much fodder the concentrate metering system 21 is to deposit per unit of time in the feeding trough 15 during the milking period, so as to provide that the quantity of fodder to be dispensed is distributed uniformly or at least substantially uniformly over the feeding period. The fodder doses deposited in the feed through 15 are measured such that the animal 3 can always eat some fodder during the feeding period in the milking/feeding box. Since the animal 3 remains quiet during eating, it is possible for the sensor 10 to determine with great precision the position of the teats of the animal to be milked, and the teat cups 9 can be connected relatively quickly to the teats of the animal.

[0023] Using the measuring device 18, it is further determined how much fodder the relevant animal has consumed during the feeding period. If after the feeding period it is found that the animal has left fodder behind in the feeding trough, this quantity is stored in the computer in the file of the relevant animal as still owing to it and this quantity can optionally be added in one or more subsequent feeding periods. If thereafter another animal reports at the milking/feeding box 1, then in the computer the quantity of fodder left behind in the feeding trough 15 is deducted from the quantity of fodder to be supplied to the relevant animal. In a further (non-shown) embodiment, the feeding trough may include means, with the aid of which the feeding trough 15 can automatically be emptied before a further animal enters the milking/feeding box 1. Stored in the (non-shown) computer there is also a threshold value, which can be set by an operator and which represents the difference between the quantity and/or the weight of the fodder dispensed to and consumed by the animal during the feeding period. When this threshold value is exceeded, the computer outputs a signal. An operator can then be notified by means of a (non-shown) attention list print-out of the computer that one or more animals show deviations in the fodder consumption. In addition, a second threshold value may have been stored in the computer, which value implies that the said first threshold value has been exceeded by a predetermined percentage. If the second threshold value is exceeded, the relevant animal is automatically isolated

by means of a (non-shown) computer-controlled gate in a (non-shown) separate section.

[0024] To stimulate the consumption rate of the fodder, e.g. with highly productive animals, which must take in much fodder in a relatively short period of time, the electric motor 36 of the grinding device 31 is energized with the aid of the computer, so that fodder delivered by the blade wheel 29 to the grinding device 31 is ground. The fodder, ground or not ground, can optionally be moistened by means of the computer-controlled spraying device 20 so as to increase in this manner the rate of consumption still further. As the number of revolutions of the electric motor 36 driving the blade wheel 29 is variable, it is possible to effect a very accurate, optionally continuous metering of the fodder in the feeding trough 15.

[0025] In addition, a computer-controlled drinking bowl, such as the drinking bowl 19, may be placed in or at the milking/feeding box 1, with the aid of which liquid, such as water and/or milk, can be supplied depending on the animal (Figure 1). Furthermore, the liquid and/or (concentrated) fodder can preferably be supplied during the anticipated milking period and/or pre-treatment period and/or after-treatment period. Thus, it is possible to adapt the feeding and/or drinking period when it is found that the teat cups 9 cannot be fitted on the teats of an animal in the anticipated period of time, or when the animal kicks off one or more teat cups and the milking cluster is to be connected again.

[0026] The invention is not limited to the features described in the foregoing, but also relates to all the features shown in the drawings.

Claims

1. A construction including an implement for milking animals, such as cows, equipped with a milking robot (6), **characterized in that** the construction comprises a metering device (21) for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period can be determined, on the basis of the feeding period, the computer applies a signal to the metering device (21), with the aid of which the metering device (21) is automatically adjusted, such that a quantity of fodder still to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period, and **in that** using the measuring device (18), it is measured how much fodder the relevant animal has consumed over a predetermined feeding period.
2. A construction according to claim 1, **characterized in that** the implement comprises a feeding trough (15) as well as one or more measuring devices (18) for measuring the weight and/or the quantity of fodder in said feeding trough (15).
3. A construction as claimed in claim 2, **characterized in that** the measuring device (18) comprises piezo-electric elements.
4. A construction as claimed in claim 2 or 3, **characterized in that** the construction comprises a metering device (21) for dispensing fodder, such as concentrate, as well as a computer, with the aid of which a feeding period can be determined, the arrangement being such that a quantity of fodder to be dispensed to the animal is distributed uniformly or at least substantially uniformly over the feeding period.
5. A construction as claimed in claim 1 or 4, **characterized in that** the feeding period is approximately equal to the anticipated milking period of a relevant animal.
6. A construction as claimed in any one of the preceding claims, **characterized in that** the feeding period can be adapted to the anticipated, required time for preparing the milking operation, such as cleaning of the teats, connecting the teat cups to the teats, premilking.
7. A construction as claimed in any one of the preceding claims, **characterized in that** the feeding period can be adapted to the anticipated, required time for after-treatment of the teats and/or the udder after milking.
8. A construction as claimed in any one of the preceding claims, **characterized in that** the implement comprises means for enabling an animal to leave a milking/feeding box, such as e.g. a computer-controlled exit door and/or expelling device, which means are activated at least not until after the feeding period has ended.
9. A construction as claimed in claim 8, **characterized in that**, if it has been established by the computer that the pre-treatment and/or the milking and/or the after-treatment has/have been finished whilst the feeding period of the relevant animal has not yet elapsed, the feeding period is adapted so as to provide that the animal receives the remaining quantity of fodder more rapidly.
10. A construction as claimed in any one of the preceding claims, **characterized in that** the feeding period is automatically adjusted, after it has been found that prior to and/or during and/or after milking unwanted time delays have occurred, e.g. because an animal has kicked off a teat cup which has to be refitted, so that the fodder is as yet uniformly distributed over the remaining anticipated feeding period.
11. A construction as claimed in any one of the preceding claims, **characterized in that** the metering device (21) comprises means (27), with the aid of which

- always relatively small portions of fodder are dispensed in the feeding trough (15).
12. A construction as claimed in claim 11, **characterized in that** the means comprise a motor (36) having a controllable number of revolutions and blades (29) driven by said motor (36). 5
13. A construction as claimed in any one of the preceding claims, **characterized in that** the implement comprises a grinding device (31), by means of which the fodder to be dispensed can be ground. 10
14. A construction as claimed in claim 13, **characterized in that** the grinding device (31) is disposed near the metering device (21). 15
15. A construction as claimed in claim 13 or 14, **characterized in that** the grinding device (31) comprises a plurality of fixed, spaced-apart grinding members (34, 35). 20
16. A construction as claimed in any one of the preceding claims, **characterized in that** the feeding trough (15) is attached to a feeding box (1) by means of a pivotal parallelogram construction (16) . 25
17. A construction as claimed in any one of the preceding claims, **characterized in that** a milking robot (6) is arranged in or near the feeding box (1). 30
18. A construction as claimed in any one of the preceding claims, **characterized in that** the implement comprises a cow identification system. 35
19. A construction as claimed in any one of the preceding claims, **characterized in that** in a computer it is determined for each animal individually how much fodder is to be dispensed by the metering device (21) per feeding period and/or per 24 hours' period. 40
20. A construction as claimed in claim 1, **characterized in that** it is determined after each feeding period, using the measuring device (18), how much fodder has been left behind in the feeding trough (15), and that the computer deducts this quantity from the quantity of fodder to be supplied to a subsequent, other animal reporting at the feeding trough (15). 45
21. A construction as claimed in claim 20, **characterized in that** the quantity of fodder left behind in the feeding trough (15) is added to the quantity of fodder the relevant animal receives in one or more subsequent feeding periods. 50
22. A construction as claimed in any one of claims 1, 20 or 21, **characterized in that** it is possible to set in the computer a threshold value which represents the 55
- difference between the quantity and/or the weight of the fodder supplied during a feeding period and the fodder consumed by the animal, whilst, when this threshold value is exceeded, the computer gives a signal.
23. A construction as claimed in claim 22, **characterized in that** the signal is in the form of a light signal and/or a sound signal and/or a message on a display screen and/or an attention list print-out of the computer.
24. A construction as claimed in any one of claims 1 or 20-23, **characterized in that** exceeding of the threshold value is used to check the health of an animal, and that, after the computer has found that the threshold value has been exceeded by a predetermined percentage, the animal is automatically isolated in a separate section.
25. A construction as claimed in claim 24, **characterized in that** separating an animal is effected by means of a computer-controlled gate arranged near the feeding/milking box (1).
26. A construction as claimed in any one of the preceding claims, **characterized in that** the feeding device comprises means for adding a liquid to the fodder.
27. A construction as claimed in claim 26, **characterized in that** the means for adding the liquid comprise a computer-controlled valve and/or a spraying device (20).
28. A construction as claimed in claim 27, **characterized in that** the spraying device (20) is arranged near the feeding trough (15).
29. A construction as claimed in any one of the preceding claims, **characterized in that** the milking box (1) comprises a drinking bowl (19), in which, depending on an animal, a quantity of liquid, such as water and/or milk, can be supplied.
30. A construction as claimed in claim 29, **characterized in that** the liquid is supplied together with concentrate.
31. A construction as claimed in any one of the preceding claims, **characterized in that** the duration of the feeding period is controllable.
32. A construction as claimed in any one of claims 29-31, **characterized in that** the liquid is supplied during the anticipated milking period and/or pre-treatment period and/or after-treatment period.

Patentansprüche

1. Anlage mit einem Gerät zum Melken von Tieren, wie z. B. Kühen, das mit einem Melkroboter (6) ausgestattet ist,
dadurch gekennzeichnet, daß die Anlage eine Dosiervorrichtung (21) zur Ausgabe von Futter, wie z. B. Kraftfutter, sowie einen Computer umfaßt, mit dessen Hilfe eine Fütterungszeit festgelegt werden kann, aufgrund derer der Computer ein Signal an die Dosiervorrichtung (21) gibt, mittels dessen die Dosiervorrichtung (21) automatisch derart eingestellt wird, daß eine noch an das Tier abzugebende Futtermenge gleichmäßig oder zumindest im wesentlichen gleichmäßig über die Fütterungszeit verteilt wird, und daß mit Hilfe der Meßvorrichtung (18) gemessen wird, wieviel Futter das jeweilige Tier während einer vorgegebenen Fütterungszeit aufgenommen hat.
2. Anlage nach Anspruch 1,
dadurch gekennzeichnet, daß das Gerät einen Futtertrog (15) sowie eine oder mehrere Meßvorrichtungen (18) zum Messen des Gewichts und/oder der Menge des Futters in dem Futtertrog (15) umfaßt.
3. Anlage nach Anspruch 2,
dadurch gekennzeichnet, daß die Meßvorrichtung (18) piezoelektrische Elemente umfaßt.
4. Anlage nach Anspruch 2 oder 3,
dadurch gekennzeichnet, daß die Anlage eine Dosiervorrichtung (21) zur Ausgabe von Futter, wie z. B. Kraftfutter, sowie einen Computer umfaßt, mit dessen Hilfe eine Fütterungszeit festgelegt werden kann, wobei die Anordnung so getroffen ist, daß eine an das Tier abzugebende Futtermenge gleichmäßig oder zumindest im wesentlichen gleichmäßig über die Fütterungszeit verteilt wird.
5. Anlage nach Anspruch 1 oder 4,
dadurch gekennzeichnet, daß die Fütterungszeit etwa gleich der voraussichtlichen Melkzeit eines entsprechenden Tieres ist.
6. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß die Fütterungszeit an die voraussichtliche, benötigte Zeit zum Vorbereiten des Melkvorganges, wie z. B. Reinigen der Zitzen, Anschließen der Zitzenbecher an die Zitzen, Vormelken, angepaßt werden kann.
7. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß die Fütterungszeit an die voraussichtliche, benötigte Zeit zum Nachbehandeln der Zitzen und/oder des Euters nach dem Melken angepaßt werden kann.
8. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß das Gerät Vorrichtungen umfaßt, die es einem Tier ermöglichen, eine Melk-/Fütterungsbox zu verlassen, wie z. B. eine rechnergesteuerte Ausgangstür und/oder Austreibvorrichtung, wobei die Vorrichtungen zumindest erst nach Beendigung der Fütterungszeit betätigt werden.
9. Anlage nach Anspruch 8,
dadurch gekennzeichnet, daß bei Feststellung durch den Computer, daß die Vorbehandlung und/oder das Melken und/oder die Nachbehandlung beendet sind/ist, während die Fütterungszeit des betreffenden Tieres noch nicht abgelaufen ist, die Fütterungszeit angepaßt wird, um zu bewirken, daß dem Tier die restliche Futtermenge schneller zugeführt wird.
10. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß die Fütterungszeit automatisch angepaßt wird, nachdem festgestellt worden ist, daß vor und/oder während und/oder nach dem Melken unerwünschte Zeitverzögerungen aufgetreten sind, z. B. weil ein Tier einen Zitzenbecher weggetreten hat, der wiederangeschlossen werden muß, so daß das Futter dennoch gleichmäßig über die restliche voraussichtliche Fütterungszeit verteilt wird.
11. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß die Dosiervorrichtung (21) eine Vorrichtung (27) umfaßt, mittels der stets relativ kleine Portionen von Futter in den Futtertrog (15) eingeleitet werden.
12. Anlage nach Anspruch 11,
dadurch gekennzeichnet, daß die Vorrichtung einen Motor (36) mit steuerbarer Drehzahl und von dem Motor (36) angetriebene Schaufeln (29) umfaßt.
13. Anlage nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, daß das Gerät eine Mahlvorrichtung (31) umfaßt, mittels der das auszugebende Futter gemahlen werden kann.
14. Anlage nach Anspruch 13,
dadurch gekennzeichnet, daß die Mahlvorrichtung (31) nahe der Dosiervorrichtung (21) angeordnet ist.
15. Anlage nach Anspruch 13 oder 14,
dadurch gekennzeichnet, daß die Mahlvorrichtung (31) eine Vielzahl von feststehenden, auf Abstand liegenden Mahlgliedern (34, 35) umfaßt.
16. Anlage nach einem der vorhergehenden Ansprüche,

- dadurch gekennzeichnet, daß** der Futtertrog (15) mittels einer schwenkbaren Parallelogrammführung (16) an einer Fütterungsbox (1) angebracht ist.
17. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** ein Melkroboter (6) in oder nahe der Fütterungsbox (1) angeordnet ist. 5
18. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** das Gerät ein Kuhidentifikationssystem umfaßt. 10
19. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** in einem Computer für jedes Tier einzeln festgelegt ist, wieviel Futter von der Dosiervorrichtung (21) pro Fütterungszeit und/oder pro 24-Stunden-Zeitraum auszugeben ist. 15
20. Anlage nach Anspruch 1, **dadurch gekennzeichnet, daß** nach jeder Fütterungszeit mit Hilfe der Meßvorrichtung (18) gemessen wird, wieviel Futter im Futtertrog (15) zurückgeblieben ist, und daß der Computer diese Menge von der Futtermenge abzieht, die an ein nachfolgendes anderes Tier auszugeben ist, das sich beim Futtertrog (15) einfindet. 20 25
21. Anlage nach Anspruch 20, **dadurch gekennzeichnet, daß** die in dem Futtertrog (15) zurückgebliebene Futtermenge zu der Futtermenge hinzugerechnet wird, die das betreffende Tier während einer oder mehrerer anschließender Fütterungszeiten erhält. 30
22. Anlage nach einem der Ansprüche 1, 20 oder 21, **dadurch gekennzeichnet, daß** in dem Computer ein Grenzwert eingestellt werden kann, der die Differenz zwischen der Menge und/oder dem Gewicht des während einer Fütterungszeit zugeführten Futters und dem von dem Tier aufgenommenen Futter repräsentiert, wobei der Computer bei Überschreiten dieses Grenzwertes ein Signal gibt. 35 40
23. Anlage nach Anspruch 22, **dadurch gekennzeichnet, daß** das Signal in Form eines Lichtsignals und/oder eines Tonsignals und/oder einer Mitteilung auf einem Bildschirm und/oder eines Wartungslisten-Ausdrucks des Computers gegeben wird. 45 50
24. Anlage nach einem der Ansprüche 1 oder 20 bis 23, **dadurch gekennzeichnet, daß** das Überschreiten des Grenzwertes zum Anlaß genommen wird, die Gesundheit eines Tieres zu überprüfen, und daß das Tier automatisch in einer separaten Abteilung isoliert wird, wenn der Computer festgestellt hat, daß der Grenzwert um einen vorgegebenen Prozentsatz überschritten wurde. 55
25. Anlage nach Anspruch 24, **dadurch gekennzeichnet, daß** das Absondern eines Tieres mit Hilfe eines rechnergesteuerten Tores erfolgt, das nahe der Fütterungs-/Melkbox (1) angeordnet ist.
26. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die Fütterungsvorrichtungen zum Zusetzen einer Flüssigkeit zu dem Futter umfaßt.
27. Anlage nach Anspruch 26, **dadurch gekennzeichnet, daß** die Vorrichtungen zum Zusetzen der Flüssigkeit ein rechnergesteuertes Ventil und/oder eine Sprühhvorrichtung (20) umfassen.
28. Anlage nach Anspruch 27, **dadurch gekennzeichnet, daß** die Sprühhvorrichtung (20) nahe dem Futtertrog (15) angeordnet ist.
29. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die Melkbox (1) ein Tränkebecken (19) umfaßt, in dem in Abhängigkeit von einem Tier eine Menge an Flüssigkeit, wie z. B. Wasser und/oder Milch, verabreicht werden kann.
30. Anlage nach Anspruch 29, **dadurch gekennzeichnet, daß** die Flüssigkeit zusammen mit Kraftfutter verabreicht wird.
31. Anlage nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, daß** die Dauer der Fütterungszeit steuerbar ist.
32. Anlage nach einem der Ansprüche 29 bis 31, **dadurch gekennzeichnet, daß** die Flüssigkeit während der voraussichtlichen Melkzeit und/oder Vorbehandlungszeit und/oder Nachbehandlungszeit zugeführt wird.

Revendications

1. Construction comprenant une installation pour traire des animaux, tels que des vaches, équipée d'un robot trayeur (6), **caractérisée en ce que** la construction comprend un dispositif de dosage (21) pour distribuer du fourrage, tel qu'un concentré, ainsi qu'un ordinateur, à l'aide duquel on peut déterminer une période d'affouragement, l'ordinateur délivrant, sur la base de la période d'affouragement, un signal au dispositif de dosage (21), à l'aide duquel le dispositif de dosage (21) est automatiquement réglé, de telle sorte qu'une quantité de fourrage restant à distribuer à l'animal soit distribuée uniformément ou au moins sensiblement uniformément pendant la période d'affouragement, et **en ce que**, en utilisant le dispositif

- de mesure (18), on mesure la quantité de fourrage que l'animal concerné a consommé pendant une période d'affouragement prédéterminée.
2. Construction selon la revendication 1, **caractérisée en ce que** l'installation comprend une mangeoire (15) ainsi qu'un ou plusieurs dispositifs de mesure (18) pour mesurer le poids et/ou la quantité de fourrage dans ladite mangeoire (15).
 3. Construction selon la revendication 2, **caractérisée en ce que** le dispositif de mesure (18) comprend des éléments piézoélectriques.
 4. Construction selon la revendication 2 ou 3, **caractérisée en ce que** la construction comprend un dispositif de dosage (21) pour distribuer du fourrage, tel qu'un concentré, ainsi qu'un ordinateur, à l'aide duquel on peut déterminer une période d'affouragement, l'agencement étant tel qu'une quantité de fourrage devant être distribuée à l'animal est distribuée uniformément ou au moins sensiblement uniformément pendant la période d'affouragement.
 5. Construction selon la revendication 1 ou 4, **caractérisée en ce que** la période d'affouragement est approximativement égale à la période de traite prévue d'un animal concerné.
 6. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la période d'affouragement peut être adaptée au temps nécessaire prévu pour préparer l'opération de traite, par exemple pour nettoyer les trayons, relier les gobelets trayeurs aux trayons, effectuer la pré-traite.
 7. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la période d'affouragement peut être adaptée au temps nécessaire prévu pour le post-traitement des trayons et/ou du pis après la traite.
 8. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'installation comprend des moyens pour permettre à un animal de quitter un box de traite/d'affouragement tels que, par exemple, une porte de sortie et/ou un dispositif d'expulsion commandé par ordinateur, lesquels moyens sont actionnés au moins pas avant que la période d'affouragement ne soit terminée.
 9. Construction selon la revendication 8, **caractérisée en ce que**, s'il a été établi par l'ordinateur que le prétraitement et/ou la traite et/ou le post-traitement a été terminé alors que la période d'affouragement de l'animal concerné ne s'est pas encore écoulée, la période d'affouragement est adaptée de façon à faire en sorte que l'animal reçoive
- la quantité restante de fourrage plus rapidement.
10. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la période d'affouragement est automatiquement réglée, une fois qu'il a été découvert que, avant et/ou pendant et/ou après la traite, des retards indésirables de traite se sont produits, par exemple parce qu'un animal a donné un coup de patte dans un gobelet trayeur qui doit être remis en place, de telle sorte que le fourrage soit jusque là uniformément distribué au cours de la période d'affouragement prévue restante.
 11. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le dispositif de dosage (21) comprend des moyens (27) à l'aide desquels des portions de fourrage toujours relativement petites sont distribuées dans la mangeoire (15).
 12. Construction selon la revendication 11, **caractérisée en ce que** les moyens comprennent un moteur (36) possédant un nombre contrôlable de tours et des pales (29) entraînées par ledit moteur (36).
 13. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'installation comprend un dispositif de broyage (31) au moyen duquel le fourrage à distribuer peut être broyé.
 14. Construction selon la revendication 13, **caractérisée en ce que** le dispositif de broyage (31) est disposé à proximité du dispositif de dosage (21).
 15. Construction selon la revendication 13 ou 14, **caractérisée en ce que** le dispositif de broyage (31) comprend une pluralité d'organes de broyage fixes et espacés les uns des autres (34, 35).
 16. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la mangeoire (15) est fixée à un box d'affouragement (1) au moyen d'une construction pivotante en forme de parallélogramme (16).
 17. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** un robot trayeur (6) est disposé dans ou près du box d'affouragement (1).
 18. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** l'installation comprend un système d'identification des vaches.

19. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que**, dans un ordinateur, il est déterminé individuellement pour chaque animal la quantité de fourrage qui doit être distribuée par le dispositif de dosage (21) par période d'affouragement et/ou par période de 24 heures. 5
20. Construction selon la revendication 1, **caractérisée en ce qu'il** est déterminé, après chaque période d'affouragement, à l'aide du dispositif de mesure (18), la quantité de fourrage qui a été laissée dans la mangeoire (15), et **en ce que** l'ordinateur déduit cette quantité de la quantité de fourrage devant être délivrée à un autre animal suivant se présentant devant la mangeoire (15). 10
21. Construction selon la revendication 20, **caractérisée en ce que** la quantité de fourrage laissée dans la mangeoire (15) est ajoutée à la quantité de fourrage que l'animal concerné reçoit au cours d'une ou plusieurs périodes d'affouragement suivantes. 15
22. Construction selon l'une quelconque des revendications 1, 20 ou 21, **caractérisée en ce qu'il** est possible de définir dans l'ordinateur une valeur de seuil qui représente la différence entre la quantité et/ou le poids du fourrage délivré pendant une période d'affouragement et le fourrage consommé par l'animal, tandis que, lorsque cette valeur de seuil est dépassée, l'ordinateur délivre un signal. 20
23. Construction selon la revendication 22, **caractérisée en ce que** le signal se présente sous la forme d'un signal lumineux et/ou d'un signal sonore et/ou d'un message sur un écran de visualisation et/ou d'une sortie imprimée de liste d'avertissement de l'ordinateur. 25
24. Construction selon l'une quelconque des revendications 1 ou 20 à 23, **caractérisée en ce que** le dépassement de la valeur de seuil est utilisé pour contrôler la santé d'un animal et **en ce que**, une fois que l'ordinateur a détecté que la valeur de seuil a été dépassée d'un pourcentage prédéterminé, l'animal est automatiquement isolé dans une section séparée. 30
25. Construction selon la revendication 24, **caractérisée en ce que** la séparation d'un animal est effectuée au moyen d'une porte commandée par ordinateur disposée à proximité du box d'affouragement/de traite (1). 35
26. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le dispositif d'affouragement comprend des moyens pour ajouter un liquide au fourrage. 40
27. Construction selon la revendication 26, **caractérisée en ce que** les moyens d'ajout du liquide comprennent une soupape et/ou un dispositif de pulvérisation (20) commandé par ordinateur. 45
28. Construction selon la revendication 27, **caractérisée en ce que** le dispositif de pulvérisation (20) est disposé à proximité de la mangeoire (15). 50
29. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** le box de traite (1) comprend un abreuvoir (19) dans lequel, en fonction d'un animal, une quantité de liquide, tel que de l'eau et/ou du lait, peut être fournie. 55
30. Construction selon la revendication 29, **caractérisée en ce que** le liquide est délivré en même temps que le concentré.
31. Construction selon l'une quelconque des revendications précédentes, **caractérisée en ce que** la durée de la période d'affouragement est contrôlable.
32. Construction selon l'une quelconque des revendications 29 à 31, **caractérisée en ce que** le liquide est fourni pendant la période de traite et/ou la période de prétraitement et/ou la période de post-traitement prévue.

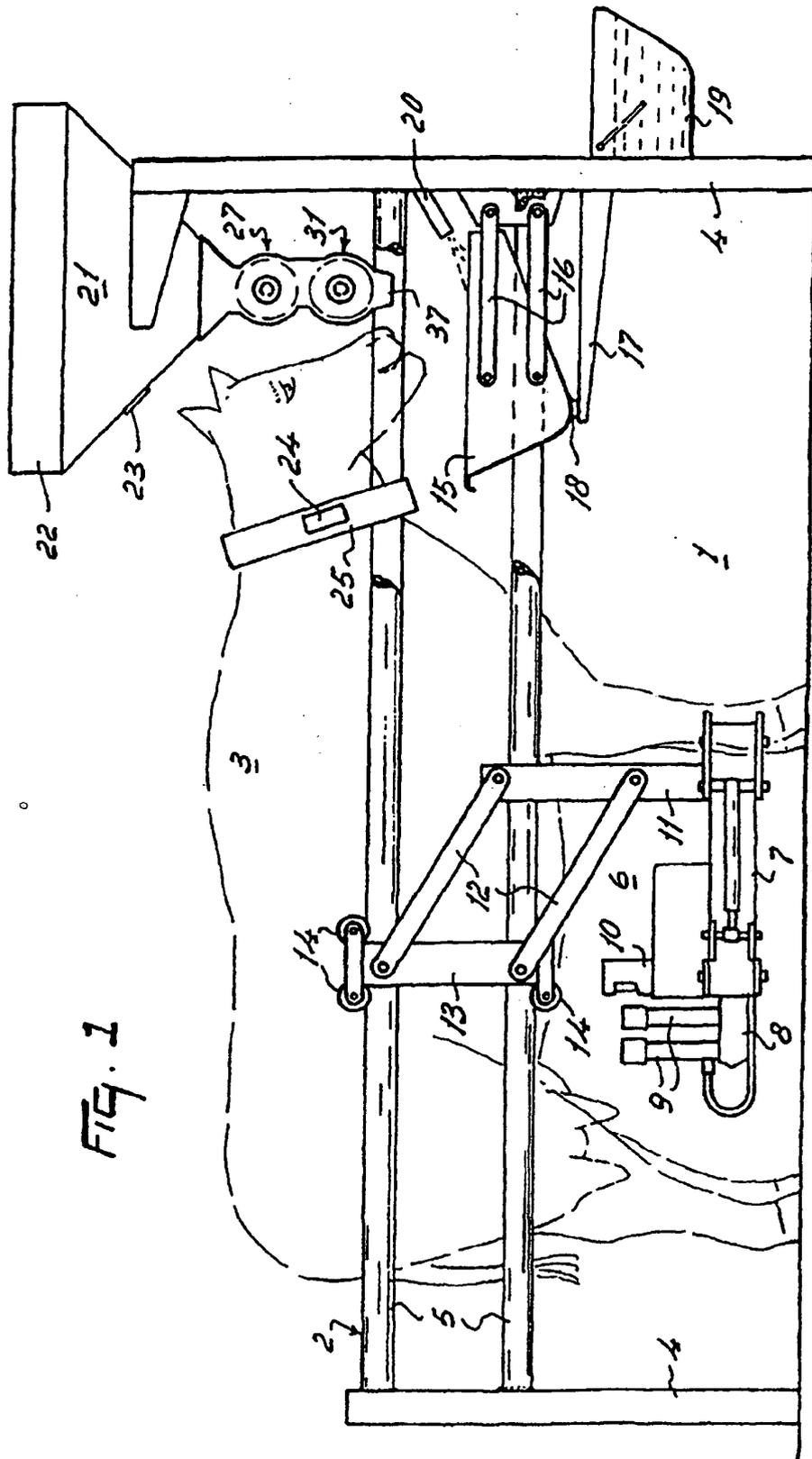


FIG. 1

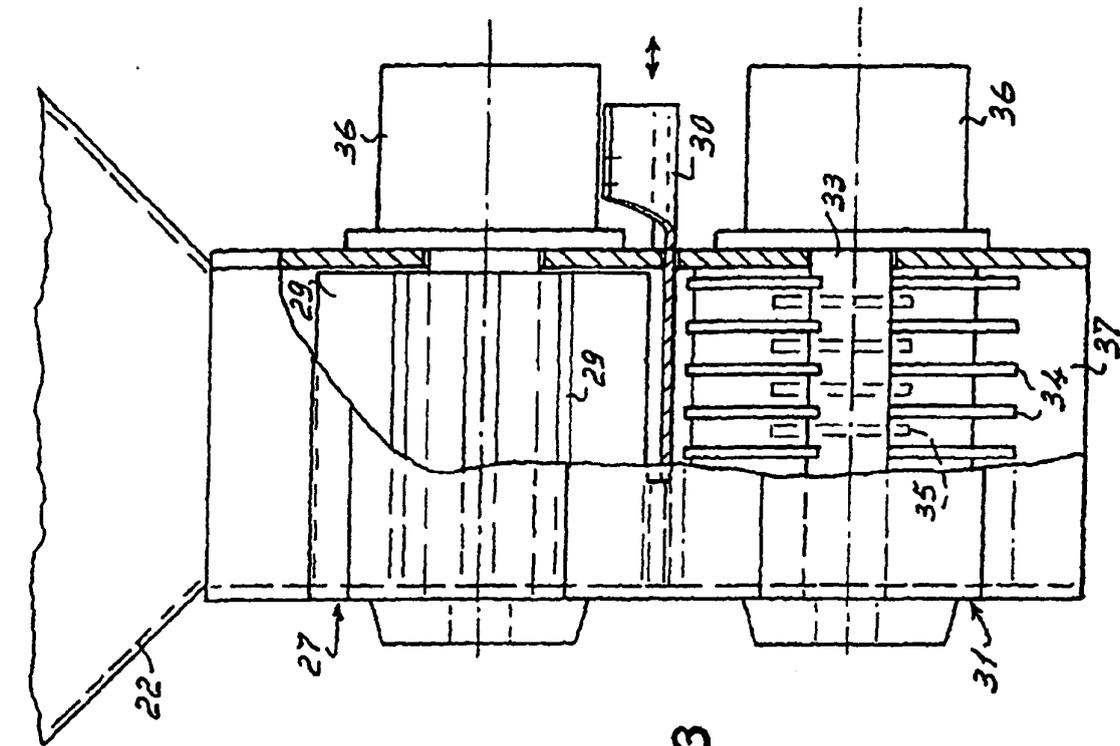


FIG. 3

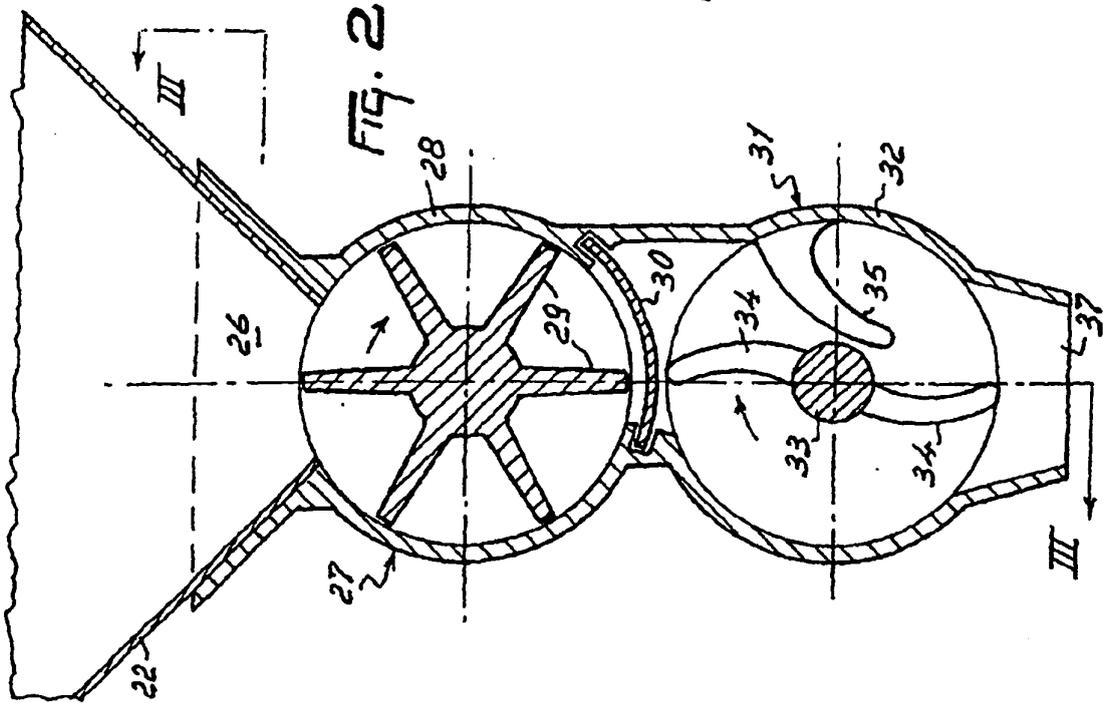


FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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